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ABSTRACT

THIS DOCUMENT PROVIDES AN ANALYSIS AND SYNTHESIS OF TRADE AND INDUSTRIAL EDUCATION RESEARCH STUDIES PRIMARILY FROM AUGUST 1966 TO APRIL 1, 1969, WHICH INVOLVED THE COLLECTION OF DATA AND COMPARISON EITHER BETWEEN GROUPS OR CORRELATION OF PIECES OF DATA FOR THE SAME GROUP. SOURCES RANGED FROM BOOKS, JOURNALS, AND DISSERTATIONS TO PAPERS PRESENTED AT MEETINGS AND UNPUBLISHED STUDIES. THE REVIEW PROVIDES AN OVERVIEW OF RESEARCH IN THE FOLLOWING AREAS: (1) PHILOSOPHY AND OBJECTIVES, (2) MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES, (3) CURRICULUM DEVELOPMENT, (4) EDUCATIONAL PROGRAMS, (5) INSTRUCTIONAL MATERIALS AND DEVICES, (6) LEARNING PROCESSES AND TEACHING METHODS, (7) STUDENT PERSONNEL SERVICES, (8) FACILITIES AND EQUIPMENT, (9) TEACHER EDUCATION, (10) ADMINISTRATION AND SUPERVISION, (11) EVALUATION, AND (12) RESEARCH. AN EXTENSIVE BIBLIOGRAPHY OF THE REVIEWED LITERATURE IS APPENDED. THE FIRST REVIEW OF THIS SUBJECT COVERING RESEARCH FINDINGS FROM 1962-1966 IS AVAILABLE AS ED 011 560. (GR)

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review and
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Trade and Industrial Education

second edition

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The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Comprehensive and Vocational Education Research, U. S. Office of Education. It serves a catalytic role in establishing consortia to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;

2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;

3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;

4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;

5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and inservice education program;

6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Resources Information Center located in the U. S. Office of Education.

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Research 43

REVIEW AND SYNTHESIS OF RESEARCH IN TRADE AND INDUSTRIAL EDUCATION

Second Edition

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PREFACE

This *Review and Synthesis of Research in Trade and Industrial Education* is one of a second generation of papers which assess the "state-of-the-art" in vocational and technical education fields. The first review and synthesis in this area was published in 1966. This review should assist in identifying substantive problems and methodological approaches for researchers, as well as provide practitioners with a summary of research findings which have application to trade and industrial education programs.

The pace of research and development activities has greatly increased during the period under review because of legislative mandates for program change and availability of funds for research. Gaps in the review which exist for some readers are probably the result of the authors' prerogative to be selective of the most representative reports in the field of trade and industrial education.

This review and synthesis is intended to provide researchers and practitioners with an authoritative analysis of the literature in the field. Those who wish to examine primary sources of information should utilize the bibliography. Where ED numbers and EDRS prices are cited, the documents are available in microfiche and hardcopy forms from the ERIC Document Reproduction Service.

The profession is indebted to Albert J. Pautler and Carl J. Schaefer for their scholarship in the preparation of this noteworthy contribution toward the improvement of trade and industrial education. Recognition is also due Merle E. Strong, University of Wisconsin; Willard M, Bateson, Wayne State University, and Edward K. Hankin, Temple University for their critical review of the manuscript prior to its final revision for publication.

Members of the profession can be helpful by offering suggestions for the improvement of the review and synthesis series and by suggesting specific topics or problems for future reviews.

Robert. Taylor
Director
The Center for Vocational
and Technical Education

INTRODUCTION

As in the first publication (1966) of this review, the following definition of Trade and Industrial (T & I) Education, as set forth in the American Vocational Association publication on definitions, has been adopted:

> . . . instruction which is planned to develop basic manipulative skills, safety judgement, technical knowledge and related occupational information for the purpose of fitting persons for initial employment in industrial occupations and upgrading or retraining workers employed in industry.

Individuals so trained will engage in occupations concerned with designing, producing, processing, assembling, maintaining, servicing or repairing of any product or commodity.

Every attempt has been made to restrict the materials reviewed to research studies, such studies invoiving the collection of data and comparison either between groups or correlation of pieces of data for the same group. Articles presenting an author's opinion have been included in instances where the opinion appears to be supported by documentation. Sources ranging from books, journals, and dissertations to papers presented at meetings and unpublished studies have been utilized.

The first review of this area contained research findings primarily from the years 1962-1966. This publication reviewed articles primarily from August 1966 to April 1, 1969.

The authors would like to express their appreciation to all those who supplied materials relevant to recent research in T & I education. Special thanks are expressed to Mr. Clifford Easton who abstracted most of the articles contained in this review and Mr. Benjamin Shapiro, director of the Rutgers Curriculum Laboratory, who made available many of the journals that were reviewed.

Albert J. Pautler
Carl J. Schaefer

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REVIEW AND SYNTHESIS OF RESEARCH IN TRADE AND INDUSTRIAL EDUCATION

PHILOSOPHY AND OBJECTIVES

The Bridge Between Man and His Work (1968) resulted from the Advisory Council on Vocational Education, 1968. The Advisory Council made 26 recommendations based upon its comprehensive review of vocational education. The Council states that the study of the world of work is a valid part of education for all children—it documents for youth the necessity of education, both academic and general.

The Vocational Education Amendments of 1968 (Public Law 90-576) (1968) was signed by President Johnson. The law should aid states in providing persons of all ages with vocational training or retraining that is of high quality, realistic and personally appropriate. The Declaration of Purpose of the law states the following:

> It is the purpose of this title to authorize Federal grants to States to assist them to maintain, extend, and improve existing programs of vocational education, to develop new programs of vocational education, and to provide part-time employment for youth who need the earnings from such employment to continue their vocational training on a full-time basis, so that persons of all ages in all communities of the State—those in high school, those who have completed or discontinued their formal education and are preparing to enter the labor market, those who have already entered the labor market but need to upgrade their skills or learn new ones, those with special educational handicaps, and those in postsecondary schools—will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests and ability to benefit from such training. (Sec. 101)

The Advisory Council's report and the 1968 Amendments were the two highlights of the period 1966-1969 in vocational education. It is now up to those of us in vocational education to live up to the challenges that face us in the future.

Leighbody (1968a) stated, ". . . the Council found little or no change in the policies or practices of vocational education during the years since 1963, but expressed a guarded optimism in the capacity of the vocational movement to achieve the needed changes if given more time and resources."

Barlow (1967) stated:

> Vocational education is a social process, invented by society for its own good. . . . When social change is in the air, vocational education must make adjustments to meet the requirements of such change. . . . Adjustments of the program of vocational education must continue to be made upon the basis of the needs of people and the occupational world. (p. 11)

Larson (1968), in the article "The Philosophy Education Forgot" appearing in the American Vocational Journal, states:

> Quality education for non-college bound youth must reflect the employers needs. It must magnify to the student his opportunities in a selected field of occupation though he never earns a "sheepskin." It must give meaning to the expression "learning is a continuous process." Today no education is terminal. (p. 23)

Venn (1967) writing about new directions in vocational education states:

> The time has come for vocational education to change both its functions and aims. Vocational or occupational education must do more than provide a job skill as an immediate utility. It must provide a broad education and a marketable skill suitable to the times and the need. . . . Vocational education must be made a part of the mainstream of education, for it can teach persons the technical skills which are now so desperately needed. (p. 4)

Schaefer (1968) states that the problem is to make education relevant to the needs of boys and girls. Feldman (1966) is also greatly concerned with the relevancy of education and especially vocational education. He states the following:

> In the junior and comprehensive high school teaching program, academic teachers would be teamed with vocational teachers representing laboratory, shop, and similar settings. They would arrange their teaching in a coordinator curriculum each to reinforce the other and the subject matter.

The challenge is clear, the funds should be available, are we able to meet the needs of society, seems to be the question.

MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES

National Opportunities and Projections

The U.S. Department of Labor (1966) published details of industrial and occupational manpower requirements. The unemployment rate was assumed to be 3 percent, and the basic patterns of employment which had developed in the postwar period were assumed to continue. As a percent of the total employed, jobs in government and services were expected to increase sharply. The major finding of the study was that although the occupation demand will change substantially, the overall demand for semi-

skilled workers will not decrease by 1975. However, it will decrease somewhat as a percentage of the total employed.

Stern and Johnson (1968) demonstrated that there is a possibility of a shift from blue-to white-collar workers in response to the changing demand for labor and that this shift can be encouraged by appropriate government action.

The U.S. Department of Labor (1967) specified two areas of data deficiency. First, current occupational information is inadequate, and second, information on occupational mobility and related factors is almost completely lacking. Accurate and up-to-date information in both of these areas is of utmost importance for supply projections, although the former is also of importance for demand projections.

Blaugh and others (1967) showed that people in the same occupation can often have different educational backgrounds and experience, and that no one education-experience requirement stands out as obviously appropriate for each occupation. Thus, it seems that under certain conditions, training for an occupational cluster is more realistic than for a specific occupation. The desired outcome, hopefully, would be greater flexibility and smoother adjustments of supply in response to changes in demand. Cassell (1966) thought that the only method to close the "employability" gap was by meaningful training programs.

Swerdloff (1966) stressed that, at present, one difficulty was the lack of understanding of the dynamics of manpower supply and demand. Morton (1966) recommended the formation of a data bank so that data could be easily and quickly obtained and made fully comparable. He also recognized that federal statistical data did in fact constitute a national resource and that the need for improvement was great, both in improving existing statistics and collecting new data.

Scoville (1966) tried to obtain education and training requirements on an occupational basis and to relate this information to the mobility characteristics of occupations. Many of the employment services examine their local employment data and project it in the light of national trends, modifying the results by their own detailed local knowledge. Striner (1966) explained how a complete research strategy should be formulated with the emphasis on the development of methodological models and evaluative techniques for judging the effectiveness of manpower programs.

In recent years, there has been an increase in manpower planning at the individual firm level. Wallenstein (1966) presented an introduction to the principles of technical manpower planning. By cooperating with educational institutions of the community and the local branches of the state employment service, individual firms can make their own requirements known and therefore, contribute to a situation of equilibrium in the local labor market.

The U.S. Department of Labor (1968) reported that among the 18-year-olds and older men in the work force, unemployment in 1967 among white men declined from 4 percent for high school dropouts to 2.3 percent for graduates, and 1.3 percent for those with some college. Unemployment dropped in similar fashion among non-white men (mainly Negroes); it fell

from 8.8 percent among those with 1 to 3 years of high school education, to 5.4 percent among those who were graduates, and 3.2 for those with additional education.

Our Special Problem: Youth

In an insightful cataloging of the issues and the challenge to vocational education, Kemp (1966) pointed out that for the socio-economically handicapped youth, the only reliable solution is education and training. The problem of equal opportunity extends beyond the school, of course. Kovarsky (1967), in a conference on human resource development, surveyed the status of the Negro worker up to the present and detailed a somewhat pessimistic prospect for his being afforded equal access to jobs and to the concomitant benefits of an increasingly affluent society.

Garbin (1967) explored factors relating to transition of modern youth from school to work with the intention of identifying specific impediments to smooth lasting adjustments. From 49 specific worker-adjustment problems that were identified, the 4 most often cited were: 1) unrealistic aspirations and expectations, 2) poor attitudes toward work and working, 3) lack of responsibility, maturity and self discipline, and 4) lack of knowledge of the real demands of work.

A number of programs in industry have been concerned with the training of the hard core unemployed. What has been learned has been widely circulated contributing to the impression that much is being done in this field. Burt and Striner (1968) state that a few employers are providing upgrading and promotional opportunities and programs for their employees who require special and remedial services for both entering into and retaining initial jobs. The number of hard core unemployed individuals hired, trained and promoted in any particular company studied is very small compared to the total number of employees in the company.

In 1967, as reported by the U.S. Department of Labor (1968), there were 27.5 million workers without high school diplomas employed. Unfortunately, an additional 1.5 million without diplomas were unemployed; they constituted 56 percent of the unemployed population 18 years old and over and included 60 percent of those who had been out of work for 15 weeks or more.

Currently, one of five youngsters leaving school does not receive a high school diploma, according to U.S. Department of Labor (1968) statistics. In 1966, 600,000 youngsters embarked on their life careers without this important qualifying credential. One report, summarizing nine surveys covering over 21,000 dropouts, found that 11 percent of the dropouts were students of very high ability. The National Education Association (1967) reported that general mental ability is not important in identifying potential dropouts.

Women in the Labor Force

Lee and others (1967) have compiled statistics concerning the work

patterns of women. Recommendations for each of the vocational fields were presented which might serve to encourage increased attention to programs which serve women. Implications and recommendations included, 1) the need for better and faster communication (information to those planning programs for women who may enter the labor force), 2) research upon which predictions may be made, need for resources such as curriculum guides, prepared educational media materials, and 3) more guidance for girls. The main implications for T & I education were as follows: 1) recruitment of women for T & I programs, 2) studying possible new occupations as well as educational programs and job requirements.

The U.S. Department of Labor (1968) issued a special labor force report *Women and the Labor Force.* The report indicates that the continuing change of greatest effect, as well as greatest magnitude, in labor force participation, is among married women. In March 1967, the labor force participation rate was only about 35 percent for women in the prime childbearing ages of 25 to 34 years, whereas the rate was 45 percent for the age group 45 to 54 years, in which childbearing is mostly over and labor force participation is at its peak. A higher proportion of Negro than white wives work at some time during the year, and do so in every category of presence and age of children. Overall, 61 percent of the Negro and 46 percent of the white married women worked at some time during 1966. Primarily because of the kinds of work they do, greater proportions of Negro than white wives are unemployed during the year, are jobless longer and more often. Unemployment rates tend to be higher among Negro than white women with comparable years of schooling. The occupations in which Negro and white women tend to work reflect to some extent the lower educational attainment and lack of training of the Negro women as well as discriminatory hiring practices. Women's labor force participation is expected to continue to increase in coming decades. The female labor market has been projected for 1980 at about 36 million; more than half again as large as it was in 1960.

Opportunities and Projections by States

Johnston and Methee (1966) showed, consistent with the projections of the nation's total labor force, variations by geographical location. The West is expected to show the greatest increase (36 percent) through the present decade, decreasing slightly up to 1980. Details were given by individual states.

New Jersey (1966) reported that 5,204 apprentices were employed in 1965, 86 percent of whom received related instruction in the public schools. Of the employed apprentices, 56 percent were in the building trades and 22 percent in the machine tool trades.

The Connecticut Department of Education (1968) conducted a study of the printing industry occupations and manpower needs. Connecticut will need 3,499 additional trained persons in the printing industry by 1973. Printers reported that they have 617 current job vacancies.

The U.S. Department of Labor, Bureau of Labor Statistics (1966a) issued a special labor force report *Labor Force Projections by State, 1970-1980.*

The report indicated that between 1970-1980, the total resident labor force is expected to rise from 85.3 million to 100.7 million workers, an increase of 18 percent. The West once again will show the greatest rise, 26 percent (however, this is 10 percentage points less than during the 10 preceding years). The South will also experience a smaller gain than previously—19 percent—as compared with 25 percent for the 1960-1970 period. The Northeast region is also expected to rise somewhat less than in 1960-1970; only the North Central region will increase by about the same percentage as in the previous decade—about 17 percent. The report presents a state-by-state projection of population and the labor force through 1980.

Trade and industrial education programs will have to be increased to meet the demands of the future. Special consideration will have to be given to programs needed to meet the employment requirements of women in the world of work. This does not imply that only the traditional programs of the past are needed in larger quantities but rather that programs to meet the future needs of our country be developed as the needs occur. Flexibility of programs and adaptation should be our goal.

CURRICULUM DEVELOPMENT

Before a training curriculum can be set forth, the objectives of the training must first be identified. As Weller (1966) said quite clearly:

> . . . How can details of training be worked out until training objectives have been defined? And how can training objectives be defined without drawing up criterion behavior tests? . . . You've got to have some goal in mind when you devise training schemes. . . This means that the trainee's required performance at the end of any training course must be laid down in black and white. What tasks will he be able to carry out? What questions will he be able to answer? What challenge will he be able to meet?. . . (p. 59)

The large-scale curriculum project is a dominant fact of contemporary society according to King (1969) in an article in *Educational Leadership.* He states quite clearly:

> . . . Projects abound in mathematics and in the sciences; social studies, English and vocational studies are increasingly being served; fewer projects are undertaken in art, music and health. . . The teacher remains the master of the instructional situation, despite such innovations as team teaching, instructional television, computer scheduling, paraprofessional assistance, programmed materials and now the products of large curriculum ventures. . . Few projects to date have exploited the use of "big media" such as instructional television, computer-assisted instruction or whole filmed courses. Programmed learning materials are rarely used. (p.497)

The Structure of the Curricula to Provide Transferability

Altman (1966) used factor analysis to develop a matrix of six general vocational capability areas and a series of psychological processes that

should be useful in identifying vocational, technical and practical arts content with potential transfer value among various jobs and families of jobs. One of the major findings was that there is a definable and well-structured domain of vocational capabilities which has not previously been well defined and which is not being systematically taught by educational institutions. This domain promises to enhance the flexibility with which students can apply the results of their educational experiences.

The rapid increase in post-high school occupation programs has created some articulation problems between them and secondary level programs. Moss (1966) investigated the influence of industrial arts experience on grades earned in post-high trade and technical curriculums. He examined the effect of differences in 1) the amount of industrial arts taken, 2) grades earned in industrial arts courses, 3) content of the courses in relation to the post-high school curriculum in which the student enrolled, and 4) the primary purpose for which the industrial arts courses were offered.

Sjogren and Stahl (1966) summarized the research on common job behavior. They classified the research under three headings: 1) job analysis studies, 2) studies of psychomotor factors, and 3) studies of cognitive factors. Their findings may be useful in selecting content that has potentially high transfer value.

Maley (1966) conducted a study to define the "cluster concept," which is aimed at the development of skills and understandings related to a number of allied fields. The curriculum provides the students with skills and competencies which are common to all occupations in the cluster. A broadly prepared individual with both skills and cognitive background for a cluster of occupations is presumed to be better prepared for future technical developments.

The Quincy Public Schools (1969) are currently involved in a project using the code name ABLE. One of the expected outcomes of the project is the development of a planned set of graded levels of specific education within each area, requiring a range of preparation times designated by jobs (or job clusters).

Perkins and Byrd (1966) developed a research model using a validated questionnaire for the identification of task and knowledge clusters associated with occupational areas. They presented a paradigm for task and knowledge investigations.

Curriculum Content

Morgan and Bushnell (1967) proposed an "organic curriculum" balancing and fusing vocational and general education from the kindergarten through adulthood. They initiated pilot programs in 18 school systems scattered across the country. Yoho (1967) in the "Orchestrated Systems" developed a theoretical model for the total functioning society. By a systems network analysis, he derived content for industrial education.

Simpson (1967) developed a taxonomy of educational objectives for the psychomotor domain. This taxonomy provides a model for identifying curricular objectives involving psychomotor tasks. It also permits a more

systematic approach in curricular evaluation studies. Sherman (1966) developed a methodology for creating curriculum materials related to career planning. The theoretical construct of development tasks was used for curriculum planning and the taxonomy of educational objectives in the affective domain was used for defining the objectives of the curriculum materials.

Agan (1967) experimented with team teaching and flexible scheduling at the high school level using curriculums including certain trade and craft occupations. He identified the content appropriate for all vocational curriculums or subgroups of curriculums in the school system studies. His findings showed that it was important to involve all the vocational teachers in the team teaching effort.

Rahmlow and others (1966) developed a survey instrument for identifying clusters of knowledge and other competencies associated with performance in food service work. With adaptation, the instrument might be used effectively in other occupational specializations. Albracht (1966) developed and used a process for determining the competencies needed in the performance of essential activities in a sales occupation. His focus was on the functions of industry rather than job titles as a basis for curriculum development. This process with modification might be used effectively in other occupational areas.

Matthews and others (1966) developed a curriculum for dropout-prone students. They used special learning units in language arts, social studies, arithmetic, science, industrial arts, home economics, physical education, and work experience. The program did significantly improve the holding power of the students, but those involved in work experience did not significantly improve their academic performance.

Allen (1966) in a study of the aviation mechanics occupation noted three apparent needs: 1) national teacher institutes and workshops for updating teaching in content and methodology, 2) flexible instructional plants attuned to a continuously changing curriculum and 3) curriculum follow-through in which skills, materials and knowledge are immediately included as current instruction.

Englebart (1968) analyzed the vocational competencies in an automotive mechanics curriculum. His purpose was to develop a model for determining the competencies required by semi-skilled and skilled workers in the automotive mechanics program. His model should be usable by other educators in various vocational specializations. It is obvious that a large number of new approaches to trade and industrial education have been attempted within recent years. However, evaluative studies to determine the success or failure of the various approaches seem to be lacking. Few projects have made use of big media such as instructional television, filmed courses or computer assisted instruction.

EDUCATIONAL PROGRAMS

Curriculum development, the preceding section, dealt with various approaches which could be used to teach a particular subject matter. Educa-

tional programs, on the other hand, are delimited to possible courses which may be combined to yield a program of study.

The section is broken down into three parts. The first deals with the attainment of objectives of educational programs; the second, with the characteristics of these programs, i.e., what they include: and the third, with special programs for students with special needs.

Educational program development represents an administrative decision which can be subject to research. Program evaluation will be dealt with in the section on Evaluation.

The Attainment of Objectives

The Advisory Council on Vocational Education (1968) found little evidence that programs had made significant gains since 1965 when provisions of the Vocational Education Act of 1963 went into operation. The Council was critical of leadership and administrative inadequacies during the period. They tended to be optimistic about the future and made recommendations which are designed to emphasize the need to deal with certain persistent problems.

The Education Commission of the States (1968) in their final report, recommended as an immediate and urgent goal the placement of occupational education in the mainstream of education.

Frank (1966) reported on the Summer Study on Occupational, Vocational and Technical Education. The most quoted suggestion to come from the study was that there be a new vocationally oriented educational path to begin at the junior high level; (a) for those who have not benefited from the traditional curriculum, and (b) as enrichment for academically oriented, high achievement students.

Coleman (1967) pointed out that we now have at our disposal realistic means to think of human resources in terms of human potential rather than human exploitation. He stated with conviction that long-range manpower forecasting, guidance and counseling, and a modern relevant program of vocational education are mandatory if we are to use the human resources of the nation.

Brazziel (1966) found support for his proposition that general education would have a significant effect on post-training behavior of subjects in a program designed to provide technical skills for employability. Bennett (1967) examined the premise that level of vocational education was a better indicator of economic development than either general secondary education or the ratio of vocational to general education.

Corazzini (1966) presented cost-benefit data in line with his content that the objectives of vocational education can be more reasonably attained by the individual in high school rather than post-high school programs. Loss of income based on foregone earnings while the individual pursues a post-high school program (that might be available in high school) is not regained for at least 15 years, if ever, since high school graduates often earn as much as graduates of post-high school programs.

Maddox and others (1967) reported a four-year study of human resources. The study was conducted in 13 Southern states and dealt extensively

with the status of education and particularly with vocational-technical education. The report urged "early and continuing orientation of children and youth toward useful work beginning in the elementary schools and continuing through the junior and senior high school years." The report also noted a lack of balance among the occupational offerings and a deficiency in occupational information and guidance.

Characteristics of Educational Programs

Burt (1967) reported in a study supported by the Ford Foundation that industry representatives indicated they would like to have schools assume as much as possible the burden of initial training of new employees.

Secretary of Labor Wirtz, in the foreword of a book by Cohan and Kapp (1966), commented on the changing philosophy when he asked why the content of what children are taught should be dictated by what the system needs. He indicated that we should attempt to assure every student the opportunity to develop to his highest potential, whatever those talents may be. Weisbrod (1966) studied the relative appeal of controlling and improving human capital by investing in health or in education and suggested that the more important social benefits from education may defy monetary valuation.

Venn (1967) indicates we have reached a time when the question of occupational education comes into the same perspective as general education. He further indicates that an individual does not have an education unless he has occupational skills.

Draper (1967) in his informal study of the National Association of Secondary School Principals presented a commendatory picture of existing vocational programs. The study gave strong support for extending the programs to serve a larger segment of the school population.

Leighbody (1967) conducted a survey of various multi-occupational programs of vocational education in New York and certain other states. He reported that most of the programs studied were experimental and of recent origin. Each of them seemed to offer good opportunities for research, yet no firm plans were established to conduct the research.

Special Programs

Groves (1966) in a national survey of vocational programs for students with special needs reported that the programs sampled were similar to regular vocational programs. The majority of the programs were operated for more than one type of disadvantaged student with the curriculum planned to adapt to individual student needs and abilities. The programs were designed mainly for employment training on a broad spectrum of occupations rather than specific skills. He recommended a national survey to determine the number and location of students with special needs and research to determine the number and kind of jobs for which these students could be trained.

Deno and others (1966) in a report of a project in the Minneapolis Public Schools was concerned with expanded program development of special education and rehabilitation services for the retarded. Two of the major findings

are of concern to T & I programs. First, the vocational trade training program was inappropriate for special class students. Second, for those students placed on jobs, long-term supporting services and followup were found necessary.

Gordon and Wilkerson (1966) presented a cogent account of the history of compensatory education as related to the disadvantaged. In addition to providing an essential guide to exemplary programs of every size and description, the final chapter, a critique of compensatory education, is exceptionally effective in bringing the reader to the realization that little sustained effort has as yet been expended.

The U.S. Department of Labor (1966a) reported that of the 152,000 students enrolled in the institutional Manpower Development Training Act (MDTA) programs, 74 percent had completed training and were now gainfully employed. About one-third of the trainees were being trained for job entry at the skilled level and better than three-quarters of these obtain employment upon program completion.

The U.S. Department of Health, Education and Welfare (1967) reported that the nation is coming to acknowledge as an essential goal of education its responsibility for a continuous program of vocational education which permits subsequent retraining as it becomes necessary. The report also pointed out that as we make a growing commitment to improving systems of education for work, the need for large scale programs such as those operated under MDTA will be reduced.

The *1967 Manpower Report of the President,* (U.S. Department of Labor, 1967a), reported compensatory effort on behalf of the hard-core unemployed in conjunction with a planned re-direction of the MDTA programs. The proposal called for expending as much as 65 percent of the future training effort for programs to reclaim and rehabilitate persons classified in this group.

The U.S. Department of Labor, Manpower Administration (1967) conducted an analysis of funded MDTA projects. Although the summaries were more heavily oriented to early policy, recent statements indicate that the future emphasis of the MDTA research effort will be planned to focus on hard-core, disadvantaged, unemployed and underemployed people.

Pautler (1967a) in an article in *School Shop,* reported on an after-school program in salable skills. Short-term, after school courses were made available to all students in the high school. Among the courses were the following: residential house wiring, service station sales, welding and small engine repair.

Morgan and Mead (1968) reported on the Trade Preparatory Curriculum in Philadelphia. Their study was a comparative study of the trade preparatory, vocational and academic curricula. The trade preparatory curriculum is a special curriculum designed to offer the student an opportunity for vocational exploration as well as training in mechanical skills. They reported that the trade preparatory student seemed to be slightly less satisfied with his first job than did the student from either of the other groups. Also, the trade preparatory student seemed to be a little less optimistic about the the future than the vocational or academic students.

Many special programs are in operation. Research is lacking in most cases. Programs should be relevant to the needs of the students and the needs of society in which the student must eventually find his or her employment.

INSTRUCTIONAL MATERIALS AND DEVICES

As reported in the 1966 *Review and Synthesis of Research in Trade and Industrial Education,* there is no shortage in the literature of descriptive statements about materials and devices which have been developed and used by specific teachers in specific classes. Most hold up as interesting articles, but not of a true research nature. At this point, it still appears that research evidence is still lacking in this area, which should be of high importance to vocational education.

The April 1968 issue of *School Shop* was a special issue concerned with the use of the new media systems. Lauda (1968) suggests seven rules for effective media usage in industrial education as well as other curriculums. He indicates that the basic goal is effective communication between the teacher and the learner.

Cotrell (1968) in an article in the *American Vocational Journal* reported on the National Seminar on Educational Media in Vocational and Technical Education sponsored by the Ohio Center for Research and Leadership Development in Vocational and Technical Education.

Learning Programs—Teaching Machines

Zinn (1967) reviewed the educational research on computer-assisted instruction and identified trends and projected needs in the area.

Baker (1966) used stereo slides, two-dimensional slides, and chalkboard lectures as presentation media in teaching the principles of one point perspective drawing; the three modes were equally effective.

Bjorkquist and Kolker (1966) analyzed the reading ease of the textbooks used in two technical programs for unemployed adults. The textbook readability level was much higher in one of the programs. However, the students perceived their homework assignments as more difficult in the program using textbooks with the lowest readability level.

Suess (1966) reviewed 22 studies regarding teaching methods in industrial education. The studies cited showed that programmed instruction yielded equal immediate performance and retention to that resulting from the lecture-demonstration approach. The comparison of demonstrations to lectures showed that the former were more effective and efficient.

Impellitteri (1968) explored the potential of computer-assisted vocational guidance. The objective of this occupational exploration system is to allow youngsters to broaden their knowledge about the world of work and be able to identify appropriate opportunities for them in it. The resource is a computer-assisted occupational exploration system.

Instructional Television

Gladmon (1967) described the potential of television as a medium for use in management development programs. Canada (1967) developed organizational guidelines for televised instructional presentations.

Taylor and Christensen (1967) in an article in the *American Vocational Journal* reviewed the status of instructional media in vocational education. Their outline of the potential uses of individualized instruction, packaged learning, television and simulation provided a foundation for their appeal for concentrated research efforts in the evaluation of media.

Simmons (1968) in an article in *School Shop* reviewed the operation of the closed circuit television program at Kenosha Technical Institute. Slides and filmstrips can be televised to any or all classrooms. Courses provided by a number of instructional resource libraries can be made available to any or all classrooms.

Assignment Sheets

Pucel (1966) modified traditional instruction sheets by introducting two types of "organizers;" 1) a summary organizer of a directive type, and 2) a question organizer of a discovery type. No significant differences in initial learning, retention, or transfer were obtained when the two experimental treatments and the typical instruction sheet were used to present moderately difficult and difficult material to vocational school graduates.

Bjorkquist (1966) investigated the degree to which learning of principles of orthographic projection could be improved by the provision of scale models or pictorial drawings. Subjects who had the opportunity to learn with the assistance of pictorial drawings or scale models acquired the principles with fewer trials than subjects who had no visual aids.

Miller (1966) questioned the usefulness of traditional readability ratings for technical content in which technical terms which cannot be modified to reduce readability level, make up a significant portion of the total materials.

Miscellaneous

Phillips' (1966) study caused him to conclude that only an instructional systems approach can answer research questions related to the interaction of media, learners, teachers, and classes.

Witt and Wall (1966) made use of pilot projects to develop and evaluate instructional materials relating to gainful employment in a number of specializations. The specializations included child care, clothing, family service and food services. The major conclusion was that work experience should be a part of the curriculums in these areas.

Moeller (1967) used 8mm film and synchronized tape recordings to teach basic lathe operation. Subjects receiving the experimental treatment performed at the same accuracy level as subjects who received individual demonstrations, but the experimental subjects required more trials and took longer to attain the criterion performance.

Training in Business and Industry (1966) reported that the time to train industrial assembly workers was reduced 50 percent when the training sequence was presented by a machine using color slides and tape recordings.

Hodges and Silver (1968) reviewed various types of educational hardware that appear to be usable in industrial education programs. They

covered closed circuit television, videotape recording and audio tape, computers and computer-assisted instruction as well as dial-access systems.

Trade and industrial education programs because of their varied nature should be the chief users of instructional materials and devices. Perhaps, this is so, but research evidence is lacking to determine the relative effectiveness of the various instructional materials and media as related to T & I education. A number of research studies should be conducted dealing with media suitable to T & I educational programs.

LEARNING PROCESSES AND TEACHING METHODS

This section is divided into three sections. The first section deals with teaching methods, the second with direct-detailed vs. direct-discovery methods of instruction and the third with attitude change in the classroom.

Research studies dealing with trade and industrial education and learning processes and teaching methods are extremely limited. This accounts for the limited amount of material included in this section of the research review.

Teaching Methods

Team teaching, flexible computer scheduling and self-instructional methods have been studied by various individuals. Polos (1967) studied team teaching. He built a case for more intelligent utilization of teachers through team teaching techniques. He maintained that with team teaching, better use can be made of the unique talents of different teachers and a more systematic introduction into the profession can be provided for beginning teachers.

Coffey (1966) evaluated the efficiency and effectiveness of self-instructional methods for selected areas of vocational education. Unfortunately, too little attention was paid to developing the new and revised curriculum materials necessitated by the instructional uses of computers.

Smith and Smith (1966) hypothesized that cybernetic principles applied to learning have a great deal to offer, particularly in the area of psychomotor behavior.

The use of instructional time is being modified through flexible scheduling. Allen (1966) made use of flexible computer scheduling as a means of modifying the traditional instructional time periods.

All of the items discussed might have considerable influence on staffing patterns as well as facility planning. Likewise, those engaged in teacher education programs will have to be well advised of changes in staffing and the need for modification of teacher education programs.

Direct-Detailed vs. Direct-Discovery Methods of Instruction

A Study of the Effectiveness of Directive Versus Non-Directive Vocational Teachers as a Function of Student Characteristics and Course Format was conducted by Tuckman (1968). He reached the following conclusions: 1) Teachers of vocational subjects were more non-directive than teachers of non-vocational subjects. 2) Students were more satisfied with and pre-

ferred non-directive teachers to directive teachers, both in vocational and non-vocational areas. 3) Students earned higher grades from non-directive non-vocational teachers than they did from directive non-vocational teachers. 4) Students preferred and were more satisfied with vocational teachers than non-vocational teachers but they earned slightly higher grades from non-vocational teachers.

Brenner (1968) conducted a study to ascertain whether students who had conducted directed-discovery laboratory exercises in basic electricity were able to attain significantly greater levels of achievement than students who conducted the more traditional direct-detailed laboratory exercises. The direct-discovery group was significantly superior to the direct-detailed group with respect to problem solving performance.

Attitude Change in the Classroom

Heiner and others (1966) measured attitudes of 7th, 8th and 9th grade students towards parts of nonprofessional level work in office, retail, health service and construction occupations. They reported definite attitudes toward job parts, but occupational choice by job title was unrealistic. The nature of the job performed was the most important consideration of job choice. The environment was found to be of little importance in choice. The instrument used appeared to be an effective device for stimulating interest in occupational choice.

Since student attitudes have been shown to be influenced by teachers, it is not unreasonable to examine the attitudes of vocational teachers. Borman (1966) found that the attitudes of vocational teachers are significantly more authoritarian than the attitudes of academic teachers, but that both groups are equally intelligent.

Finch (1969) developed an instrument to measure student attitudes toward individualized shop and laboratory instruction. The results indicated that the instrument was unidimensional in nature and contained sufficient validity and reliability for the intended purpose.

STUDENT PERSONNEL SERVICES

This section has been sub-divided into five sub-sections as follows: 1) selection, 2) guidance, 3) vocational development, 4) placement, and 5) dropout identification and prevention. The first section has a strong relationship to administration and supervision since selection of students is an administrative decision. The forth and fifth sections, deal with placement and dropouts and relate to evaluation since the followup study is a valuable evaluative tool.

Selection

Astin (1967) assessed the career choices of 650 male high school seniors on the basis of their personal characteristics when they were in ninth grade. Among the 26 variables studied, measured interests and stated career choices at the ninth grade level were the best predictors of career outcomes at the twelfth grade level. According to Gross (1967), the direction of choice

is less a matter of moving toward a solution of a problem than it is a moving away from a situation that is unsatisfactory.

In a study of poverty-stricken youth, when compared with middle class Negroes, Henderson (1967) reported a significantly greater difference in ideal and real aspirations. The effect of perceived economic opportunity on aspirations was apparent in his study.

Vocational decision making was conceptualized by Hershenson and Roth (1966) as a process in which 1) the range of possibilities is narrowed, and 2) those remaining are strengthened. Holland (1966) indicated that predictions can be made that individuals will choose occupations that are in categories consistent with their personality types. His theory and most of the studies exploring it were reported in his book *The Psychology of Vocational Choice.*

Griess (1966) found that scores on the language subscale of the elementary level California Test of Mental Maturity were highly valuable in predicting scores on the general intelligence scale of the General Aptitude Test Battery (GATB) following 12 weeks of preoccupational basic education training.

Miller (1968) conducted a study of the predictive value of a pre-selected battery of standardized tests as a tool for the selection of entering students in certain trade programs in the vocational-technical schools of the State of Connecticut. Definitive conclusions regarding the predictive value of the pre-selected test battery have not been made at this time. Final results and conclusions should be available after June 1970.

Guidance

Gorman (1966) reported that guidance programs are generally oriented to the academically able student. Higher education programs training counselors have stressed this type of training. The type of work experiences industry-bound students are likely to have is *not* included in the counselor's background. The report urged the standard precepts of counseling be more rigidly observed, such as: early identification of job bound students, early work experience for the job bound, and job experience in industry for prospective counselors.

In a developmental project to develop a program of student personnel services for area vocational-technical schools, Bottoms (1966) reported the following information. Area vocational schools should provide efficient recruitment and admissions programs, a comprehensive record system, an organized orientation program, an information service, professional counselors, a job placement program and a systematic and periodic followup study of graduates, dropouts and employers for evaluating training programs.

Briggs and Norris (1966) developed techniques for selecting occupational information needed by students. They found that students progressed through stages of individual development relating to occupational information.

Gribbons and Lohnes (1966) reported findings of longitudinal research over a five-year period. They disclosed that adolescents with intelligence

slightly above average tended to lower the level of their aspirations, whereas over half the youngsters classified as having IQ's below 105 persisted in their preferences for the professions.

Crawford (1966) reported on the use of tests as a basis for guidance at the Los Angeles Trade and Technical College. Guidance into different programs is based on the student's scores on a battery of tests which have been shown to have predictive value for a particular occupational area. Tests of perceptual speed, mechanical knowledge and spatial orientation are predictive of success in auto mechanics programs while tests of manual dexterity often predict machine shop success.

Sweeney (1966) in a development program concerned with the preparation of counselors to serve disadvantaged youth made the following recommendations: 1) A state agency should compile a listing and description of functions of various agencies and facilities available to each specific area of the state (South Carolina) presently serving disadvantaged youth. 2) A study is needed to determine how present and proposed programs for the disadvantaged can be made to serve the educational, cultural and other needs for the entire range of disadvantaged. 3) Counselor candidates should be provided with field experiences which would help them to become more knowledgeable about skill levels required of T & I workers, work conditions in major industries, vocational training and entry level occupations available in the state.

Pritchard (1968) in a study entitled *Counselors View Trade and Industrial Education in Wisconsin* arrived at two conclusions. First, every graduate student pursuing a degree in guidance should complete a course in the principles of trade and industrial education, and secondly, counselors presently employed should receive an in-service course to obtain the principles of trade and industrial education.

Vocational Development

Super (1967) employed a variety of scales and judgement-making procedures to assess the vocational progress of young men from ages 18 to 25. Approximately one-third of the subjects engaged in behavior adjudged to be floundering. At age 25, one-fifth of the men still had not developed stabilizing vocational coping behavior. Less than two-fifths of the subjects actually entered one of the occupations specified while in high school.

LoCascio (1967) showed how theories of vocational development tend to emphasize the continuous, uninterrupted, and progressive aspects of behavior and thus appear to have limited significance for the disadvantaged whose development probably is characterized best as discontinuous. Tyler (1967) stated that much of what is being discovered about the stages through which an individual passes in preparing to find his place in the world of work cannot be generalized beyond middle-class males.

Borow (1966) stated that vocational decision making appears to be marked by a kind of occupational foreclosure in which many fields of work may be eliminated prematurely.

Gribbons (1966) in his study of career development was concerned with three main implications: 1) Vocational development as a most meaningful developmental concept in career choice. 2) The need by lower socio-economic groups for special career guidance and importance of counselors determining students apparent and hidden motives in stating occupational goals. 3) A delay in vocational "forced" choice may not be necessary for those showing high readiness for vocational planning. The study is still in progress.

Stevic and Uhlig (1967) found that Appalachian youth who stay in that geographic area were found to have significantly lower occupational aspirations than those who migrate to a residential area near an urban center.

Placement

The Indiana Department of Research (1967) conducted a study of 70,000 high school students from the 1966 graduating classes. The interests of graduating seniors were identified to provide necessary data for developing those areas of post-high school education needed for persons entering the labor market. About 38,000, or 54 percent, of 70,000 graduates completed a 22-item questionnaire and made curriculum and occupational choices related to their educational and vocational plans. Known characteristics and known geographical distribution of the total population of high school seniors compared favorably with the survey responses, justifying the general application of survey conclusions to the total senior population. Some general findings were: 1) 42.8 percent of the graduates planned to enter a college or university, 2) 12 percent planned to enroll in vocational or technical schools after graduation, 3) only 12,500 of the 40,000 who entered the labor force had high school subjects which were vocationally oriented, 4) student interest in vocational subjects increased during the senior year with preferences more in the business and service than in the trade and industrial area, and 5) the most frequent career selections from a list of 196 occupations were teachers (all fields), engineers (all fields), accountants, secretaries, managers (trade and service), draftsmen-designers, professional nurses, barbers-beauticians, farmers, and business machine operators. Educational implications included the need for better guidance and counseling, vocational training and re-training for 100,000 persons annually, and annual surveys of this kind.

Kaufman and Schaefer (1967) in their study the *Role of the Secondary Schools in the Preparation of Youth for Employment* found that vocational graduates obtained more manufacturing jobs, while general and academic graduates obtained more white-collar jobs, primarily clerical. Little difference among the graduates of the three curriculums was found for earnings, job tenure, reasons for leaving jobs, and job satisfaction.

An additional review of studies dealing with placement are primarily relevant to the evaluation of vocational programs and are treated in the section on Evaluation.

Dropout Identification and Prevention

French (1966) in his study of employment and characteristics of high school dropouts with high ability made the following recommendations: 1) A comprehensive functional system of vocational guidance is needed. 2) Pracitcal courses and experiences should be included early in a youth's experience so that upon completion of a program, a student may live in a "real world." 3) Extended program offerings in skilled level occupations commensurate with the capabilities of these youths must be provided. 4) A change in public apathy and attitude must evolve so that true values are placed on blue-collar workers whose skills require the same degree of intellectual ability as white-collar workers or those continuing into higher education.

Gallington (1966) found that potential dropouts who were exposed to vocational counseling and occupational information group study classes for a year showed less dropping out and fewer transfers than matched controls not exposed to the programs.

In another study, Gallington (1966a) found that the best predictors of dropping out were 1) school achievement, 2) reading and math placement and, 3) father's occupation. Furthermore, graduates had noticeably better attitudes than dropouts and were better informed about occupations.

FACILITIES AND EQUIPMENT

One answer to the problem of updating in-service vocational and thechnical teachers is supplied by Larson (1966) in his outline of a Technology Resource Center for Vocational Education (T.R.C.). The T.R.C. is designed to supplement, not supplant, existing teacher education programs. It would provide a facility specifically designed for the updating of in-service teachers. The T.R.C. with maximum programming flexibility is designed to insure the use of the latest materials available to provide an effective link between education, industry and the community.

The Wisconsin State Department (1967) projected the State's needs for vocational, technical, and adult education facilities based upon trends and existing conditions in the State. The Georgia State Department, Division of Vocational Education (1966) gathered and published extensive data regarding the State's system of area vocational and technical education facilities. Picket (1966) conducted a study preliminary to the establishment of area vocational-technical schools in Iowa.

The U.S. Department of Health, Education and Welfare (1968) in a publication entitled *Organization and Operation of a Local Program of Vocational Education* stated the following:

> A good vocational facility needs to be designed and built to accommodate the program that will be conducted in it. This means that it will have features that are different from those found in schools offering academic programs only. . . The relationship between the nature of the building and the educational program it will house is complicated by the fact that educational programs, including those in vocational education will surely change over the years. This requires that a considerable

degree of flexibility be maintained in the design and construction of the facility. (p. 67)

Uxer (1967) developed an operational research model for locating area vocational schools. Research proceded and is accompanying the development of a technology research center for vocational-technical education at Rutgers University (1966)

Facilities construction planners for residential vocational education programs will be interested in authorizations for appropriations of $25 million for 1968-1969, $30 million for 1969-1970, and $35 million for 1970-1971 and for 1971-1972 in new loan interest subsidy grants to be provided in authorizations for appropriations in the amount of $5 million for 1968-1969, and $10 million for 1969-1970. These authorizations are provided by the Vocational Education Act Amendments of 1968. Public Law No. 90-576 (1968).

The January 1969 *American Vocational Journal* devoted the entire issue of "The Modern Look in Vocational Schools," Russo (1969) suggested a guide for developing educational specifications as well as the factual data necessary to school planning for vocational and technical education. Banerdt and Stoehr (1969) related their experiences in the development of the Kenosha Technical Institute. In the article, they related their experiences in the building of the institute at Kenosha, Wisconsin. Their plan was for the greatest latitude in flexibility and growth for the future.

Mahal and Olson (1969) reviewed their experiences in planning and constructing the St. Paul Vocational-Technical Institute. They relate that the probable key to the philosophy of St. Paul's vocational program is flexibility. Jones (1969) presents eight guidelines for planning a vocational-technical education facility.

School planners should be concerned about the poor as well as good features of the new facilities. The keynote feature of new facilities should be flexibility in design to meet the changes of technology in the world of work. The type of curriculum should also influence the designers of new facilities. The educational specifications must be clear before a new facility should be constructed.

TEACHER EDUCATION

Forecasts of demand for vocational teachers show considerable inconsistency. The U.S. Department of Health, Education and Welfare (1967a) predicted the secondary and post-secondary student enrollment based on assumptions of occupational demand, growth in education facilities, and student interest and then used a teacher-to-teacher ratio of 1 to 45 to estimate vocational-technical teacher demand. The resulting forecast called for 213,300 teachers by 1970 and 350,000 by 1975. These figures may be compared with the 124,729 vocational-technical teachers actually employed in 1966.

The report of the Advisory Council on Vocational Education 1968, *The Bridge Between Man and His Work,* Publication I (1968a) U.S. Department of Health, Education and Welfare) stated the following:

Although there is need for improvement in the amount and quality of teacher education, the competence and dedication of instructional staffs is generally impressive. (p. 55)

The practice of structuring teacher education among the traditional occupational category lines perpetuates fragmentation of vocational education, severs it further from general education and hinders adaptation to labor market change. What is needed is "vocational teacher training," with specialization at advanced levels, not separation by category throughout.

O'Brian and Schaefer (1966) conducted a review of 54 studies dealing with trade and industrial teacher education. Many of the studies they reviewed in the first publication of *Review and Synthesis of Research in Trade and Industrial Education.*

Recuritment and Selection of Teachers

Hensel (1967) conducted a survey of state directors to obtain data on the number of full-time vocational-technical teachers employed in 1965 and their estimates of the numbers to be needed in 1968. The data indicated that 86,261 teachers were employed in 1965 and that 22,485 additional instructors would be needed by 1968. The American Vocational Association (1967) also conducted a study to predict teacher requirements for 1970. The study reported that 121,870 public school teachers and 6,641 manpower development training instructors were employed in 1966. The study predicted that a total of 165,152 vocational teachers would be needed to staff the programs anticipated for 1970.

Stevenson (1966) secured information from 29 state divisions of vocational education and 111 schools preparing vocational teachers. A shortage of 1,270 persons during the ensuing year was predicted by the reporting agencies. An intensive recuritment program was recommended.

Folger (1967) indicated some hope for an increased teacher supply. His analysis indicated that the percent of college graduates required to staff existing educational programs will decline from about 30 percent of college graduates to about 18 percent by 1973. This means that more prospective people will be potentially available to expand educational programs and improve areas where the quality of education could be enhanced with more teachers.

Richland and Rosove (1967) conducted a study concerning the potential utilization of retired military personnel in vocational and technical programs. They concluded that there does not exist at present any systematic procedure for channeling interested and qualified military retirees into vocational education. They indicated that there are thousands of military retirees who are occupationally and educationally qualified for vocational teaching positions and that no insuperable barriers in certification requirements exist to exclude them from teaching. Hensel (1967a) conducted a study of men being separated from the Army, Navy and Air Force. Twenty-seven percent of his sample of 1152 expressed an interest in teaching. Those with 13 or more years of education were the most interested. The percentage

of those interested rose sharply as rank increased. Eighty-two percent of those interested were willing to take one or more years of additional training to qualify for teaching. Nine percent of the sample were classified as outstanding teacher prospects.

In addition to a supply of vocational teachers from the military, former vocational instructors are another source. Thompson (1966) conducted a survey of former teachers who had graduated from degree programs and taught for at least one year before leaving the profession. Fifty-five percent of the sample held positive attitudes toward returning to teaching.

Spence (1967) reported that 62 percent of 153 teacher education programs used one or more of the following techniques to recruit high school students: 1) sending faculty to school career day programs, 2) mailing brochures to industrial arts teachers, 3) participating in on-campus senior visiting days, and 4) mailing materials to school counselors.

Finally, the U.S. Department of Health, Education and Welfare (1966) reported that teachers for MDTA programs had to be recruited through employment services, universities, newspaper advertisements and personal contacts with industry and organized labor after those available through the ranks of vocational education teachers had been depleted.

Perhaps it is time that we attempt to develop short term educational programs to prepare retired military personnel for T & I teaching assignments. A second logical step would be studies to compare the military retiree to the tradesmen from civilian occupations in their effectiveness as T & I teachers.

Teacher Competencies

Byrd (1966) in a study concerned with teacher competencies indicates that the teacher has a distinctive role in assuring continuity in the process of occupational training, competency in all phases of occupational, vocational and technical education is of general concern. Occupationally oriented persons could utilize their experience in teaching situations after competing teacher training courses. Basic competencies needed are technical and personal. Personal competencies expected include role commitment, personal involvement and recognition and transmission of a respect for the dignity of work.

Sutker (1967) reported substantial differences in attributes between teachers in different fields of vocational education. Trade and industrial teachers especially had characteristics which tended to set them apart. Job satisfaction appeared to be highest for distributive education and lowest for technical education teachers. The study included agricultural, trade and industrial, distributive education and technical education teachers in Oklahoma. The concept of role can be operationalized and the results of studies of this type can be translated into meaningful action.

Schueler and Lesser (1967) suggested that through new media approaches the teacher educator can provide more efficient means of producing teacher competencies. Included with his review of new media is a bibliography of 467 entries, many of which are of interest to vocational educators.

Teacher Education Programs

Schaefer and others (1966) reported on a symposium conducted to explore the type of program needed for the advanced degree (Ed.D) in vocational-technical education leadership. The results of the project are now operational in the Ed.D. degree program in vocational-technical education at Rutgers University—The State University of New Jersey.

O'Brian and O'Neil (1966) developed a model for a master's degree curriculum for teachers who would work with youth having special needs. The model was for vocational-technical teacher preparation.

Samson (1966) reported on an experimental summer institute for new vocational teachers in Wisconsin. The recommendation was that such work shops be no less than nine weeks in length. At least three weeks devoted to full-time field study in the community where the teacher is to be employed should be included in the nine weeks.

Lauda (1967) found that 49 of 201 industrial teacher education institutions granted credit for industrial work experience. About 40 more were planning to grant credit in the near future.

Pautler and Buzzell (1969) in an article in *School Shop* reported on the Cooperative Occupational Pre-teaching Experience (COPE) program. The program is designed to provide high school graduates, primarily from vocational and industrial arts education programs, as well as technical institute graduates, with an opportunity to combine cooperative work experience in their chosen field with an approved academic program in the pursuit of a career as a T & I educator. Graduates receive appropriate teacher certification and a B.S. degree.

Courtney (1967) explored the commonality of requirements among vocational teachers. He developed an instrument to establish a core of professional knowledges and abilities required in training programs for vocational teachers. The instrument used has 200 components using Likert scales to rate the need for each knowledge and skill in the worker's job.

Klaurens (1968) in the final report of the Upper Midwest Vocational Teacher Education Conference reported on innovative vocational and technical teacher education programs. Sedgwick presented a paper dealing with the American Industry project; Randleman, the "Relevance-Quest Curriculum"; Pautler, the Cooperative Occupational Pre-teaching Experience Program (COPE); and Haines, the Clinical School Concept. The final report should be of interest to all involved in vocational and technical teacher education programs.

Reese (1968) reported on a national research development seminar dealing with *Trade and Industrial Teacher Education and Certification.* Fifteen nationally recognized leaders in T & I met to review relevant research completed and to identify and list critical research problems, and to prepare mini-proposals for high priority studies. The report summarizes the seminar activities.

The Second Annual National Vocational-Technical Teacher Education Seminar was held in Chicago in October 1968. Hensel and Bice (1969) reported on the proceedings which were concerned with two main topics: First, differential staffing, and second, teaching the disadvantaged.

The Internship Program to prepare vocational-technical education teachers was the subject of a working conference conducted at Michigan State University. Gleason and Davis (1967) review the result of the conference and state that, "There is a great variety in the method, design and purposes of measurement and evaluation activities which could legitimately be of concern to the internship program in vocational-technical teacher preparation." (p. 33)

In-Service Programs

Dwight Allen (1966a) described microteaching as an innovative means of providing in-service education for teachers.

A summer program was conducted by Bohn (1967) for updating the technical competency of teachers of industrial subjects. The students of the in-service program were 96 industrial education teachers. As a result of the program, 31 similar workshops were reported following the original institute.

Evaluation of Teacher Education Programs

Moss (1967) conducted a review of research in vocational-technical teacher education providing a viable framework within which to perceive research and development efforts in teacher education programs. He indicated that with some exceptions, little has been done which materially contributes to the development of a science of teacher education. He states that we need a system of verified principles which will permit us to understand and control the teacher education process.

Lee and others (1968) conducted a critical qualitative analysis of existing occupational education programs and pinpointed teacher education as the key element in preparing to meet the challenge for change. He reported the need for teacher education to develop leaders and teachers with a current philosophy and the need for a partnership between the educational establishment and the private sector.

David Allen (1966a) asked 50 trade and technical leaders from 38 states to indicate the extent of innovation in their teacher education programs since 1961. The modal change reported was "slight to moderate."

Barlow (1966) recommended the assignment of research projects to every institution maintaining a concern for research and having a teacher education responsibility. He states, "Many teacher educators must have a part in the research in teacher education, but the parts must fit together."

Bjorkquist and others (1968) in a review of T & I teacher education research stated three general conclusions. "1) A sizable number of the research reports cited have been conducted by students as part of a doctoral program. 2) Recent increases in federal funding have not seemed to greatly improve the sophistication of research directed specifically toward trade and industrial teacher education. 3) The majority of the studies cited were concerned with either the teacher education process or the teacher education product."

Brandon and others (1968) in a review of T & I teacher education presented a research critique and model for action. The model represents the existing teacher education process in a dynamic way. It provides not only a categorical system of process and effects, but a series of interdependencies as well. The model should be of value to all engaged in T & I teacher education.

ADMINISTRATION AND SUPERVISION

Leighbody and others (1968) assisted in the preparation of the publication *Organization and Operation of a Local Program of Vocational Education.* This publication describes services and delineates many staff positions important in increasing the social, civic, economic and psychological impact of programs on trainees and the community. Leon P. Minear, director, Division of Vocational and Technical Education, U.S. Office of Education, states the following in the foreword of the publication:

> The challenge in its preparation was to glimpse the present and to provide a long look into the future as vocational education moves into a decade of tremendous growth. By 1975, it is estimated that there will be 14 million persons enrolled in vocational and technical education programs. This would mean approximately doubling the present enrollment. Many new programs will of necessity be opened to accommodate this 100 percent gain. Additionally, many programs will be expanded. (p. i)

Preparation of Leaders

McComas and Willey (1966) suggested that state directors of vocational education carry out active recuritment campaigns to bring administrators and potential administrators, capable of planning programs, into the fold in order to fill the demand.

O'Brian (1966) brought together the leaders from a variety of disciplines and asked them what the "new breed" of leader in vocational education should know. The following broad categories of requisite knowledge emerged: counseling and guidance; labor economics; social psychology and group dynamics; the sociology of work, industry, and minority groups; labor-management relations; industrial organization; training; facilities and, of course, the concepts of vocational education.

The importance of leadership development in vocational education was made clear in one of the recommendations of the Advisory Council on Vocational Education (1968). The Council recognized the need and recommended that the new act provide support for professional and paraprofessional staff recruitment, preparation and upgrading at all levels, including leadership, administration, teacher education, and counseling and guidance, on a regional, state and national basis.

Law (1967) reported on the New York State Vocational Education Administrative Leadership Development Program which was conducted with the cooperation of the State Education Department and the State University College at Oswego. The training program was comprised of three major

elements—a campus phase, a series of field visitations in a number of states and Canada, and a period of on-the-job internship.

Rice and Toth (1967) edited the final report of a National Conference on State Department Leadership in Vocational Education which was conducted by The Center for Vocational and Technical Education, The Ohio State University. The report contains nine background papers prepared by scholars on major forces and factors relevant to state department operations and three papers prepared by individuals charged with synthesizing the various viewpoints and drawing up implications for the emerging role of state departments and vocational divisions.

Wenrich (1968) reported on the measurement and evaluation of the results of the Michigan Leadership Development Program. One of the major accomplishments of his research is an objective quantitative measurement of leadership. He states, "Although undoubtedly in need of further refinement, the Leadership Score has potential applicability to educational leadership in general and is not necessarily restricted to vocational-technical education." (p. 39)

Administration of Local Programs

A Nationwide Study of the Administration of Vocational-Technical Education at the State Level was conducted with a number of studies. Pierce (1967), Swanson (1967), Allen Lee (1967), and Ross (1967) concentrated on a study of the evaluation, organization, administration and expenditures of vocational education at the state level in 41 states. Interviews were conducted with some 1800 persons including legislators, school board members, administrators, vocational educators and interested citizens. Findings were utilized as a foundation for the development of a prototype instrument for self-analysis by the state agencies for vocational education.

Draper (1967) in his study of vocational education conducted for the National Association of Secondary School Principals was concerned with the administrative decisions made by some states about the organization of area vocational schools and the provision of better programs and services for all schools. He indicated that " . . . it seems more feasible and more acceptable for high school students to take their vocational courses as part of a comprehensive high school program." He did present three qualifications to his position.

The Leighbody (1968) publication is intended as a helpful guide for persons who have major responsibility for developing new programs of vocational and technical education under public sponsorship at local levels. It should be of assistance to anyone concerned with the organization and operations of a local program of vocational education.

Supervision

Dwight Allen (1966) adapted computer-based scheduling to programs of vocational education. He did this after several years of development and operation in other secondary school subjects. Changes in curriculum design, staff assignment, and plant utilization were involved. The scheduling

system is intended to serve more students and to better articulate vocational education with the rest of the school program.

Uxer (1967) developed an operational model for locating area vocational schools.

Draper (1967) reported to the National Association of Secondary School Principals his findings from an extended study of vocational education at the high school level. He suggested ways of making vocational education available to many not now enrolled in vocational programs.

School Relations: Attitudes

Burt (1967) investigated school-industry cooperation in vocational-technical education in 32 cities throughout the United States. His report deals with federal and state legislation and regulations, general advisory committees, occupational cooperating committees, joint apprenticeship training and industry program coordination.

Venn (1967a) indicated that business and industry can play a vital role of assistance to vocational schools. He stated, "A partnership between schools and industry will be a step forward in providing maximum education for each youngster in our schools—education for the development of his intellectual capabilities and for a productive vocation." (p. 5)

Carruth (1968) in an article in *School Shop* reported on multi-district cooperation in vocational education through New York State's Boards of Cooperative Education Services (BOCES).

Moullette (1966) suggested the press conference as a method of informing the public about the vocational students. He outlined 22 items to be used in the planning for a news conference on vocational education. He stated the following:

> Keeping the public informed about the school's operations, activities, and policies is a continuous responsibility of school administrators. (p. 24)

Program Funding

The Vocational Education Act Amendments of 1968, Public Law No. 90-576 (1968), provides for a $355 million authorization for appropriations for 1968-1969, $565 million for 1969-1970, $675 million for 1970-1971 and new State Advisory Councils on Vocational Education provided with additional appropriations between $50,000 and $150,000, but equal to one percent of a state's allotment. (Sec. 102 and 104c)

Program planners in vocational and technical education are adopting contemporary systems of planning, budgeting and evaluation. Kotz (1967) in a report presents the issues in the movement. His study was conducted in 11 communities located in six states to determine the status of the planning, programming and budgeting process.

Davie and Patterson (1966) studied intergovernmental fiscal relations in vocational education. Federal grants-in-aid were traced from 1917 to 1963. No perceptible pattern of response by the states and localities was found

when federal funds were increased or decreased. An easing of matching requirements was recommended and adjustments in methods of determining allotments to the states was suggested.

EVALUATION

The Advisory Council on Vocational Education (1968) recommended that any new act provide that each state conduct a periodic statewide review and evaluation of its vocational education program. The criticism leveled by the Council regarded the lack of significant studies which could serve as an input to the 1966-1967 assessment of vocational education.

This section on Evaluation is divided into two sections, one on Followup Studies and the other on Evaluation Techniques.

Followup Studies

Two large scale studies have recently been completed which deal with the products of vocational programs. Both investigations introduced methodologies which may be useful to subsequent studies and they also added to the range of dependent variables. These two were the Eninger (1968) and the Kaufman-Schaefer (1967) studies.

Eninger (1968) reported that of the combined vocational graduates of 1953, 1958 and 1962, only 48 percent of those who went directly to work held their first full-time job in the occupation studies or a highly related occupation. He also reported relatively little geographic mobility among T & I graduates, especially during the first few years out of school. The data suggests that the labor market for which schools should be developing T & I skills is the local labor market, unless there are mobility-including circumstances to the contrary.

The Kaufman-Schaefer (1967) study concentrated on three major issues: adequacy of vocational education, image of vocational education and vocational education for groups with special problems. They reproted that the percentage of T & I graduates who obtained jobs directly related to their training was less than one-third. There was no evidence that graduates of separate vocational schools were better prepared or more successful in their first jobs than the vocational graduates of comprehensive high schools. If a decision as to type of school were to be based on probable attitudes of its students, the evidence would favor the separate vocational school.

Corrazzini (1966) reported that the estimated annual salaries of vocational high school graduates were $82 to $560 more than the salaries of regular high school graduates. He concluded that the income gains for a 5 or 10 year period, discounted at either 5 or 10 percent, are likely to be smaller than the additional cost of vocational training and, as a result, the benefits of the vocational programs are not sufficient to offset the added program costs. He assumed that vocational training is primarily a substitute for general on-the-job training.

The Utah RCU (1966) in a followup study of 1966 graduates, attempted to determine the extent to which terminal vocational high school students work in occupations for which they were trained, in related occupations

or in unrelated occupations. Of 2,132 employed or available for employment, 30 percent were employed full-time in the occupation for which they trained, 18 percent in related occupations, and 27 percent in unrelated occupations.

Righthand and others (1967) initiated a study in 1963 to determine the status of 1953 and 1958 graduates of Conneticut's 14 state-operated regional vocational-technical schools. Findings included the following: 1) Only 8 (1.2 percent) of the 682 graduates were unemployed in 1963. The employment rate for Connecticut in 1963 was 4.9 percent. 2) After adjustments for military service and full-time school, 71.8 percent were still employed in their trade or in a related occupation.

Pautler (1967) in a study conducted in Erie County, New York reported that 58.9 percent of the vocational graduates studied were employed in the specialization for which they trained, or a closely related occupation. The data was collected 20 months after the students were graduated. There was no significant difference among the vocational graduates and their yearly salary 20 months after graduation.

Moss (1966) investigated the effect of senior high school industrial arts training on grades earned in a post-high school industrial institute. He found that differences in amount, content and objectives of industrial arts had no observable influence on scholastic achievement of students in four different clusters of post-secondary trade and technical curriculms.

Silverman (1967) in a followup of Project Uplift I students indicated that skill training in some occupations was unrealistic in relation to labor market demands. Basic education and skill training were not interrelated and thus not maximally effective.

Evaluation Techniques

Sweany (1966) recommended planned, continuous evaluation of vocational programs, primarily in terms of graduate placement but also in terms of teaching support functions, quality of the program, availability of all students, adequacy of coverage of different fields, changes required in keeping up-to-date, effectiveness of teaching methods, efficiency of learning, comparative costs of programs, and use of funds. The Division of Adult and Vocational Research of the USOE (1966) indicated that program evaluation was assigned highest priority for research supported with vocational education in recognition of the impending national appraisal.

Starr (1967) developed a model for evaluating state programs of vocational and technical education. The model was tested in three states. Bryam (1967) was involved in a project to maximize the use of local personnel, local resources, consultant leadership and related professional assistance in the further development and trial of a system of evaluation for local programs of vocational education.

Sharp and Krasnegor (1966) summarized and analyzed 42 followup studies in vocational education which they classified as either descriptive or explanatory. They did not depreciate the value of descriptive studies, but they did argue for increased attention to explanatory studies.

Reynolds and others (1967) prepared a document published by the Pennsylvania Department of Public Instruction which is designed to be used cooperatively by the local schools and state division in self-evaluation of vocational programs. One of its major advantages is its flexibility of use. The Florida State Department of Education (1968) also has a publication designed to be used in accrediting local programs of vocational and technical education in the state. The system was being field-tested during 1968 and will be revised at the end of the trial period.

Hamlin (1968) prepared a document on evaluation which emphasized the role of citizens in evaluating programs of occupational education in public schools. Allen Lee (1968a) developed a format and criteria for self-evaluation of state divisions of vocational education.

Robb (1967) portrayed the need for regional accrediting associations to direct increase attention to occupational education. Stanton (1967) also recommended increased attention be given accreditation of programs of vocational and technical education. He examined 146 accreditation team reports to determine the commendations and recommendations by team workers.

McFadden (1967) reported on a pilot project the purpose of which was to develop and validate tests to assess student achievement in twelfth grade vocational printing programs. He concluded that the three tests used were valid and reliable and that vocational graduates who entered printing occupations had significantly greater mean level of achievement than the total norm group.

Tuckman (1967) developed and tested an evaluation model for vocational pilot programs. He made use of the "Curriculum Hierarchy for Evaluation of Course Knowledge," the "CHECK" technique. The technique is based upon a model which initially necessitates translating the learning processes and objectives into easily identifiable behavioral responses.

Kaufman (1967) has done a great amount of work with cost benefit analysis as a technique of evaluation in education. The two objectives of his project were to develop a broad methodology on which to conduct an empirical study of the costs and benefits of vocational education, and second, to conduct the study on the basis of which conclusions can be drawn about the efficiency of vocational education. The implications of the study assert that vocational-technical education does indeed have a payoff in terms of earnings and employment, when compared to other curricula. Kaufman's main concern is that only a limited segment of the population has received vocational instruction.

Moss (1968a) suggests various research approaches to the evaluation of occupational education programs. He suggests formative evaluations, expert and self-evaluations, followups, experiments, interrupted time series and regressional analysis as various techniques usable in the evaluation of occupational education programs.

RESEARCH

Tuckman and Schaefer (1966) in the first *Review and Synthesis of Research in Trade and Industrial Education* reported that the last time an issue

of the *Review of Educational Research* was devoted to research in vocational education was in October 1962. It can now be reported that the October 1968 issue of the *Review of Educational Research* was entitled "Vocational, Technical and Practical Arts Education." Jerome Moss (1968) was the guest editor for the review. It was a most helpful source in the preparation of this manuscript.

Pucel and others (1966) in a survey of educators in Minnesota identified those who were interested in conducting or receiving training for research in occupational education. Approximately 54 percent of the educational administrators in the state had supportive attitudes toward research in occupational education. They perceived the availability of local support as the major obstacle for initiating occupational education research projects.

Wilber (1966) suggested new emphasis on research in vocational and technical education offers greater opportunities for: 1) increased numbers and kinds of research projects, 2) dissemination of useful occupational findings within the various disciplines of education, 3) determination of significant student followup data, and 4) identification of student characteristics influencing occupational decisions, motivations, guidance and job placement.

Courtney (1966) surveyed vocational school directors to discover crucial problems within their institutions needing research. While agreement was meager, the following problem areas emerged: present and emerging occupations, necessary occupational competencies, factors affecting motivation of the socio-economically handicapped, improvement of community attitudes, and factors affecting decisions to move.

Moss and Nelson (1967) reported on the research activities of the Minnesota Coordination Unit for Research and Development in Occupational Education. Some of the activities of the unit were: 1) administering two conferences of occupational education researchers, 2) developing and operating a research library, 3) conducting research studies and supporting the studies of other competent persons.

The Advisory Council on Vocational Education (1968) recommended that 10 percent of the sums appropriated for the purposes listed in Section 4 (a) of VEA'63 be used by the Commissioner of Education for various research projects in vocational and technical education. As a result, Part C of the Vocational Education Act Amendments of 1968 (P.L. 90-576) is concerned with research and training in vocational education.

The fall 1968 issue of the *Journal of Industrial Teacher Education* (1968) was a special issue on the topic, "Research Policies for Vocational and Practical Arts Education." Special articles by Hanson, Wimer, Impellitteri, Tuckman, Arnold, Tomlinson, Iami, McNeill, Howe and Swanson were included in the issue. All of those interested in research in vocational education should find the issue of special value.

In 1969, there are information centers for vocational education, regional laboratories, state RCU's and numerous sources of funds. Much research has been conducted in recent years and will no doubt continue to be in the future. Local program directors of vocational education must be concerned

with research and the results of research studies. Action research and developmental projects must take place at the local level. Library shelves are filled with reports from research studies. What is needed now is action and implementation of the findings of the research studies of most significance to trade and industrial education.

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